ZENITH data systems

DESKTOP COMPUTER SYSTEMS

THE QUALITY GOES IN BEFORE THE NAME GOES ON

ZT-1 SERIES USER'S MANUAL

Personal Information Terminal

ZT-1 Series User's Manual

595-2769

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ZENITH data systems

WARNING

This equipment has been verified to comply with the limits for a Class B computing device, persuant to Subpart J of Part 15 of FCC Rules.

This equipment generates and uses radio frequency energy for its operation and if not installed and used properly, that is, in strict accordance with the instruction manual, may cause interference to radio and television reception. It has been type tested and found to comply with the RF emission limits for a Class B computing device which is intended to provide reasonable protection against such interference in a residential installation. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause interference to radio or television reception, which you can determine by turning the equipment off and on, try to correct the interference by one or more of the following measures:

- Move the equipment away from the receiver being interfered with.
- Relocate the equipment with respect to the receiver.
- Reorient the receiver antenna.
- Plug the equipment into a different AC outlet so that the equipment and receiver are on different branch circuits.

If you need additional help, consult your dealer or ask for assistance from the manufacturer. Customer service information may be found on the inside back cover of this manual or on an insert sheet supplied with this equipment. You may also find the following booklet helpful: "How to Identify and Resolve Radio- TV Interference Problems." This booklet is available from the U.S. Government Printing Office, Washington, D.C. 20402 - Stock No. 004-000-00345-4.

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REGISTRATION

To receive full benefits of your Warranty, complete and mail the accompanying Registration Card. Also, write the series and serial numbers of your equipment below. Mention these numbers in any correspondence you have with Zenith Data Systems about this equipment.

Model _____

Series _____

Serial # _____

Date Purchased _____

CAUTION

Do not remove the cover from the Video Monitor or Terminal. If service is required, return the unit to your dealer.

Read the "Monitor Operating Guide" carefully before you connect the Monitor to a power line.

SPECIAL NOTICE

Rules established by the Federal Communications Commission (FCC) permit you to connect your ZT-1 Information Terminal to a telephone line in the United States through an approved connector jack. Before you connect to the telephone line, however, you must give your local telephone company the following information:

A. Your phone number.
B. The FCC Registration number (from the label on the rear panel of your Terminal).
C. The ringer equivalence number (also from the label).
D. The USOC connector jack required (RJ11C/RJ11W, RJ12C/RJ12W, or RJ13C/RJ13W).

If your phone is not so equipped, the telephone company can provide the proper jack. However, you must not connect this equipment to a party line or coin phone installation.

The telephone company may make changes in its technical operations and procedures, but they are required to give you adequate notice if such changes might affect the compatability or use of registered equipment.

If your ZT-1 malfunctions at any time, disconnect it immediately from the telephone line and leave it disconnected until the problem is corrected. This will prevent possible damage to the phone network, and avoid having your phone service interrupted.

DO NOT attempt to repair your ZT-1.
Take it to an authorized agent of Zenith Data Systems.

INTRODUCTION

Your Zenith Data Systems ZT-1 Series Personal Information Terminal will let you "talk" with many devices over telephone lines. Built-in cues and prompts make it easy to communicate via this Information Terminal. Even a person without typing skill or computer training will find the ZT-1 easy to use.

With this Terminal connected to a telephone line, you can "talk" with information services or data banks, with another ZT-1, or with any terminal that has a compatible MODEM (modulator/demodulator) such as the Bell type 103. And, with an optional printer, you can have a paper printout of your "conversation", or use your Terminal as an electronic typewriter.

Information available from time-sharing services, for instance, includes a wide variety of subjects ranging from news, sports, weather, business and financial news, to catalog shopping, education and career planning, science, technology, and computing.

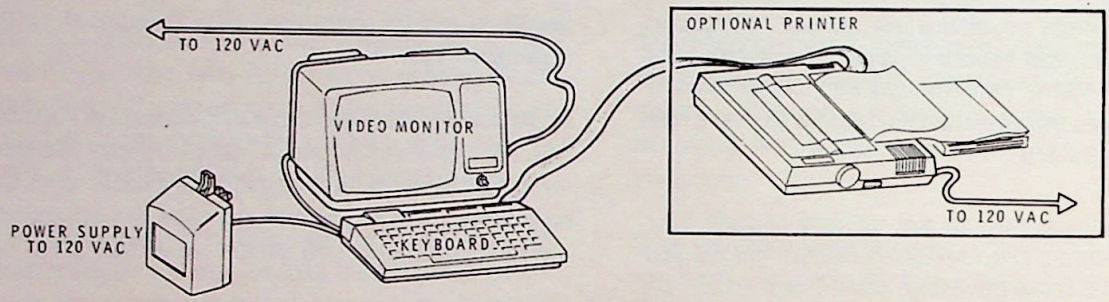
After you have installed your Terminal, you will see either a message or a Directory and a list of Actions displayed on the screen. From the list of Actions, you can manually dial a number or change the Directory to add or delete listings. With a single keystroke you can select the desired action. Then, either sub-actions or "prompts" will appear on the screen to help you perform the action.

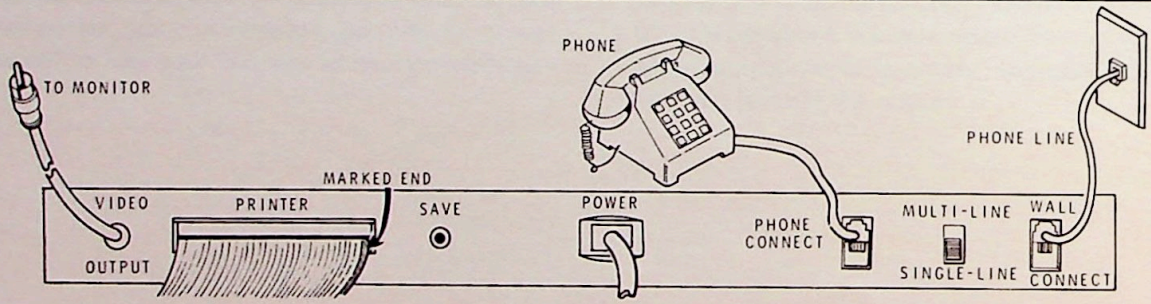
After you have entered phone numbers into the Directory, you can use the Information Terminal to automatically dial any of those numbers. A single keystroke will quickly "put you in touch" for either a voice call to your favorite aunt, or a data call to a computer data bank, time-sharing service, or another ZT-1. Or, you can use the Manual Dial feature to dial a new number from the keyboard.

This Manual will tell you how to set up and operate your Terminal in a short time. The Operation section will tell you how to store numbers in the Directory, call a friend, or go "On Line" with a subscription time-sharing service. Later sections of the Manual will present a detailed description of the keyboard and its characters, plus the special function and command keys.

An Appendix offers technical information on such things as ESC (escape) sequences, ASCII (American Standard Code for Information Interchange) characters, and Graphics capabilities. This information will allow the advanced user to more fully apply the many unique capabilities of the Terminal.

A TYPICAL SETUP





REAR PANEL OF ZT-1

SETUP AND TESTING

Whether at home or in your office or business, you will want to set up your Information Terminal for greatest convenience and ease of operation. Select a desk or table of the right height (standard height is 27 inches). It should have a surface area large enough for the Keyboard and Video Monitor, with room for reference materials and note taking. Consider also whether or not you will use a printer. If so, allow sufficient room.

Be sure you have enough 120 VAC electrical outlets available to power the Keyboard and Monitor, as well as a printer (if used). You will also need a telephone line with a modular plug and jack. If your telephone has the older 4-prong connector, or a terminal block, you will need to obtain adapters to accept the modular plugs. When you register your equipment with the telephone company, tell them the type of connection you have, or have them install the proper connectors.

Shown at the left is a typical setup, with an optional printer, and the location of the sockets and connectors on the rear panel of the Terminal. Perform the following steps to interconnect your equipment.

Connect the shielded cable from the VIDEO OUTPUT jack on the rear of the Keyboard to the VIDEO IN jack on the Monitor. Set the Monitor CHARACTER switch to 80, if your Monitor is so equipped.

Connect the Monitor power cord to an electrical outlet and place the Monitor power switch in the ON position. This will allow the Monitor's cathode ray tube to warm up while you complete the setup.

Set the MULTI LINE/SINGLE LINE switch to SINGLE for most normal applications. The setting of this switch depends on the type of modular telephone jack you are plugged into. For single line (most residential) installations connected to an RJ11 jack, the switch must be in the down (SINGLE) position. For multi line key set installations (mostly in offices) connected to an RJ12 or RJ13 jack, the switch should be in the up (MULTI) position.

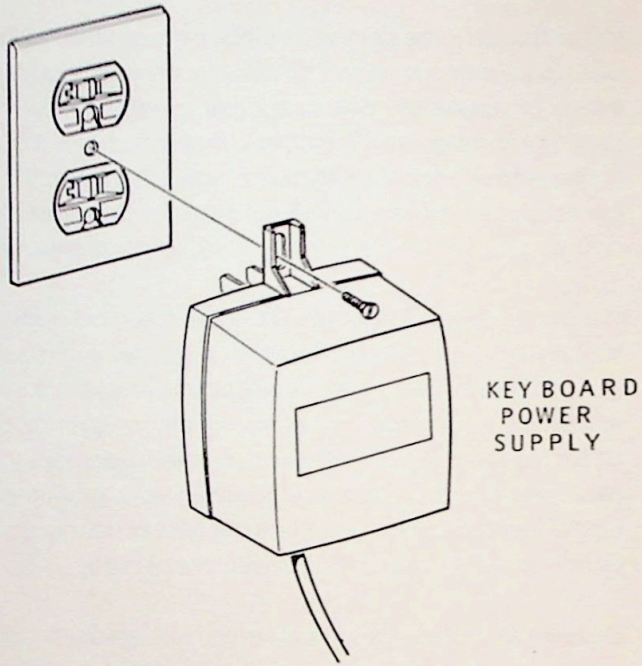
Disconnect the modular plug from your telephone base and plug it into the WALL CONNECT jack on the rear of the Keyboard.

Connect the modular phone cable (supplied) to your telephone base and to the PHONE CONNECT jack on the rear of the Keyboard.

NOTE: If you desire greater distance between the phone and your Terminal, you might exchange the wall cable with the cable supplied. However, you MUST use the phone cable that is supplied with the Terminal, either between the phone base and Keyboard, or between the wall jack and the Keyboard.

If you have a printer, refer to "Using a Printer" on Page 44 for the proper type and connections. Then connect its cable to the PRINTER socket on the rear of the Keyboard and connect its power cord to an electrical outlet.

Connect your Keyboard power supply cable to the POWER socket, and plug the power supply into an electrical outlet. First remove the plate screw from the wall outlet and use it to mount the power supply securely, as required by Underwriters Laboratories.

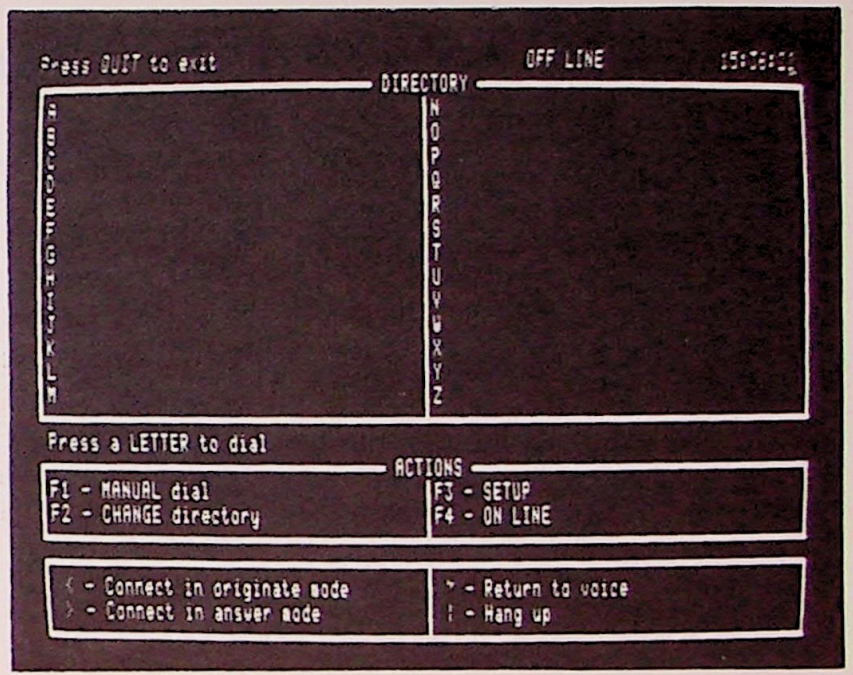


NOTE: The Keyboard does not have an on/off switch. It is live whenever its power supply is connected between an AC outlet and the POWER socket on the rear panel. Although the rear panel of your Keyboard may become quite warm to the touch after a period of operation, this is normal and presents no danger.

MONITOR ADJUSTMENT

You may need to adjust your Video Monitor for optimum viewing in your setup. Familiarize yourself with the adjustments as described in your "Monitor Operating Guide", then make the adjustments as needed:

- Adjust the Black Level (Brightness) and Contrast controls for good visibility under the lighting conditions in your room.
- Set the Character (80/40) switch to 80, if your Monitor is so equipped.
- With the Main Menu displayed on your screen, adjust the Height and Width controls so the display nearly fills the screen. Observe the corners of the display to be sure no characters or lines are lost.



THE MAIN MENU

- Adjust the Horizontal and Vertical Hold controls so the display is stable.

When you first connect your Information Terminal to a power line, you may see a message telling you to "Hold SAVE button, then hit RETURN". This process will set up 26 blank entries in the Directory and run a quick test of the electronics. The initial message will not appear again unless power remains disconnected for a period of time long enough for the internal battery to become discharged.

The Main Menu should now appear on the screen showing a Directory and Actions menu. If your Monitor screen remains dark with no message or menu, adjust the Black Level (Brightness) control on your Monitor. If you still do not see a message or menu, refer to the "In Case of Difficulty" section of your ZT-1 Owner's Manual.

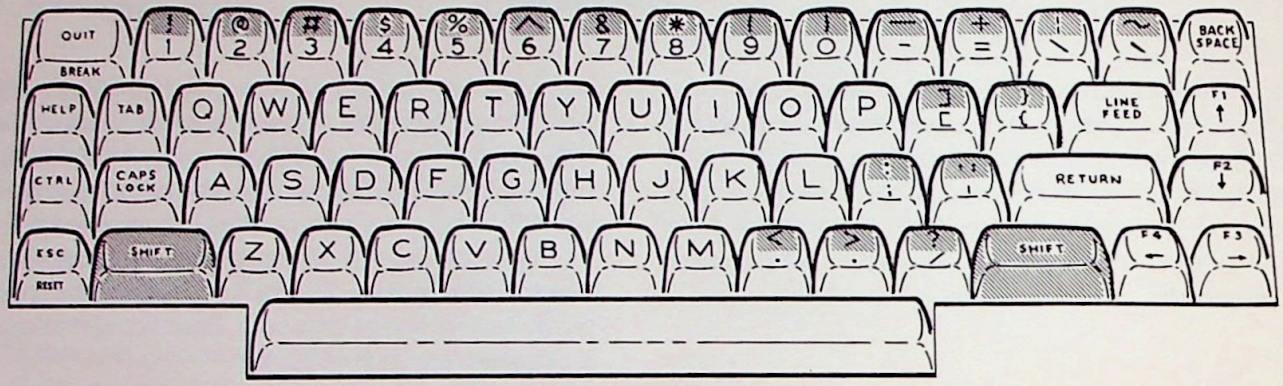
Press QUIT; the Main Menu will disappear, leaving only a "Status Line" including the prompt "PRESS HELP". Note that the Status Line will always display whether there is a Menu on the screen or not, but the prompt may differ. The Status Line and the Main Menu are starting points for the operation of your Terminal. These will be described fully in the "Operation" section that follows.

Proceed to the "Operation" section on the next page.

OPERATION

Operation of the Information Terminal is quite simple. Whether you use it primarily to communicate with a remote computer, time-sharing service, or another terminal, or as an automatic telephone dialer for frequently-called phone numbers; you will find it easy to select functions with a single keystroke. Messages and prompts that display on the screen will guide you through successful communications.

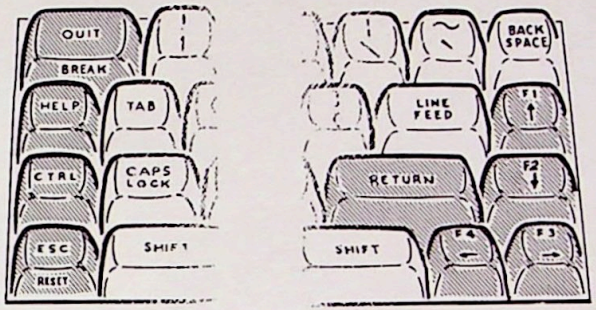
The following pages will introduce you to the Keyboard and describe how numerals and other characters respond differently when you press a SHIFT key or the CAPS LOCK key. Then the Terminal will be described, including the Status Line, the Main Menu, and the Actions Menu. Practice examples will let you Manual Dial phone numbers and enter numbers in the Directory and dial them. The SETUP menu and the operating parameters will also be discussed. Operation of the Keyboard is described later in this Manual.



The Keyboard

The typewriter-layout Keyboard has 26 letters, 10 numerals, 11 punctuation and special character keys, 11 control or function keys, 4 cursor control/action-select keys, and a space bar, as shown above. The lower-case letters, numerals, and characters on the lower half of the key tops are produced as long as you do not press the CAPS LOCK or SHIFT keys.

Upper-case (capital) letters and the characters on the upper half of the key tops are produced when you hold a SHIFT key down while striking a letter or character key. However, only the alphabet letters are affected by the CAPS LOCK key. Even with the CAPS LOCK key pressed, you MUST hold down a SHIFT key to produce any of the characters printed on the upper half of the key tops, shown shaded in the illustration above.



The Terminal

The following paragraphs will tell you how to use the control and function keys (QUIT, HELP, CTRL, ESC, F1, F2, F3, F4, and RETURN) to select Actions from the Menus, and the letter keys to respond to most prompts. In the practice examples, the CAPS LOCK key will not affect your typed responses.

The practice examples will show you how to select Actions from the Menu to Manual Dial a phone number, to enter a number in the Directory and dial that number, and to communicate with your time-sharing service or another ZT-1 Terminal.

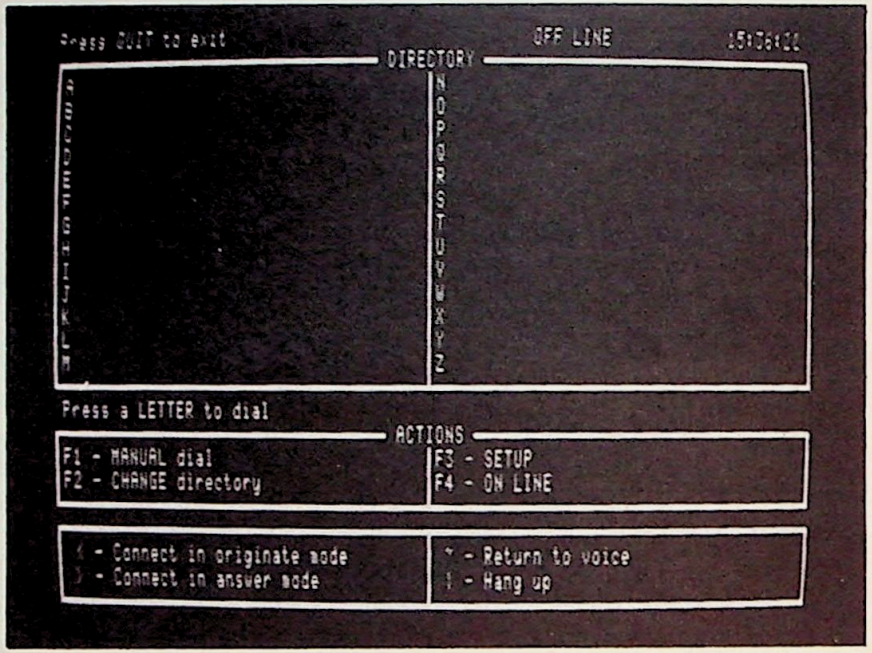
THE CURSOR

The cursor is a small block of light, either flashing or steady, that appears on the screen under various conditions. You first saw the cursor when "Press HELP" appeared on the Status Line. You will see it again when you select Actions, and after instructions or prompts on the screen.

Since the cursor is intended to attract your attention, it is normally flashing. However, you will be able to change it to a steady block of light after you read the "Setup" section of this Manual.

THE STATUS LINE

At the top of the Monitor screen, a Status Line shows you whether the Terminal is ON LINE or OFF LINE, and a 24-hour clock shows the hour, minute, and second from the point of power-up or reset. The Status Line also shows the prompt "Press HELP" or "Press QUIT to exit". The Status Line and clock will remain on the screen whether or not a Menu is displayed, but the prompt message may change. Instructions for setting the clock will be presented later under "Setup".



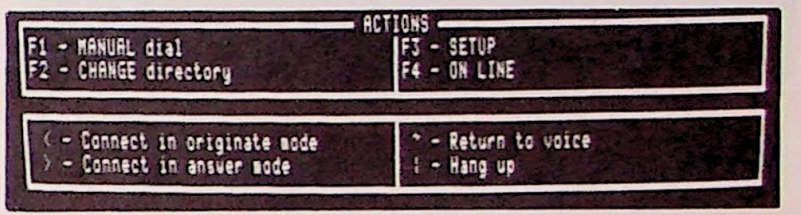
THE MAIN MENU

With your Terminal set up as directed earlier, you either have the message "Press HELP", or the Main Menu on your Monitor screen. If it says "Press HELP", do so now and the Main Menu will appear.

The Main Menu contains a Directory, the words "Press a LETTER to dial", and the ACTIONS: "MANUAL dial", "CHANGE directory", "SETUP", and "ON LINE". The Main Menu is the starting point for all Actions available on your Terminal. If you "Press QUIT to exit", the screen will go blank with only the Status Line and "Press HELP" showing. As you select Actions from the Main Menu, secondary menus and prompts will appear. Whenever you press QUIT to exit from a secondary menu, the previous menu (from which you selected the Action) will return.

ACTIONS MENU

Below the Directory on the Main Menu are ACTIONS that you can select by pressing a function key. Each of these Actions will be described, with practice examples, on the following pages.



NOTE: Although the function keys (F1, F2, F3, and F4) show on the upper half of the cursor control key tops, you need not press the SHIFT key when you select an Action from any menu.

F1 — MANUAL dial

Press the F1 key to select MANUAL dial. Note that the Directory disappears and the Actions menu now shows, as follows, with the cursor after the Dial # =.

```
ACTIONS
F1 - Change dial #          F3 - Dial Data
     Dial # =               F4 - Dial Voice
```

The cursor is a cue or prompt that tells you what to do. So, heed the prompt as follows:

Think of someone you would like to call to try out your new Terminal. Type his /her phone number at the cursor and you will see the number as you enter it. NOTE: If you type a hyphen in the number, a 1-second pause will result when you dial that number. If you type a / (slash), a pause of up to 5.7 seconds will result. This pause feature will be explained in the "Setup" procedure on Page 23.

Press RETURN and the cursor will disappear, waiting for you to dial the number or change the number. If you noticed that you typed the wrong number or want to change it, press F1 (Change dial #). Then enter the correct number followed by a RETURN.

```
ACTIONS
F1 - Change dial #          F3 - Dial Data
     Dial # = 9823395       F4 - Dial Voice
```

NOTE: When you dial a Voice call, either by Manual Dial or from the Directory, you must remove the telephone handset from its cradle before the dialing is completed. Otherwise, the call will not be completed.

Press F4 (Dial Voice) momentarily, and wait. The Main Menu will return to the screen with the word "DIALING". You will hear clicking sounds from your Terminal as it "dials" the number.

Hold the telephone handset to your ear and you will also hear the dialing sounds, just as if you were dialing the number on the phone.

When your party answers, talk as you normally would and hang up the handset when you are through.

NOTE: If a number had been entered previously and power to your Terminal had not been interrupted, the most recently entered number will show after the "Dial # =". To dial that number, simply select F4 (Dial Voice).

To dial a different number, press F1 (Change dial #), enter the new number, and press RETURN. Then press F4 to dial.

```
ACTIONS
F1 - MANUAL dial            F3 - SETUP
F2 - CHANGE directory       F4 - ON LINE

< - Connect in originate mode     ^ - Return to voice
> - Connect in answer mode        ! - Hang up
```

F2 — CHANGE directory

You can store a name and phone number in each of the lettered areas that appear in the Directory. The following practice examples will enable you to set up the Directory with your often-used phone numbers.

NOTE: The number of listings you can enter in the Directory may be limited by the number of characters you type in each entry. Keep each entry short if you want to maximize the number of entries. For example, enter only a first name, nickname, or initials, and omit hyphens in the numbers unless you need them to inject a pause when you are dialing.

From the Main Menu ACTIONS, Select F2 (CHANGE directory). Note that the Action now gives you the options:

```
ACTIONS
F1 - ADD          F3 - CHANGE
F2 - ERASE        F4 - ERASE ALL
```

Select F1 — ADD (Directory entry). Pick a letter where you want to store a phone number and type that letter after "Entry to ADD:". The screen will prompt you with "Name:", so you type the name and press RETURN.

After "Phone:" type the phone number and a RETURN. If you type a hyphen or a slash (/) between digits, a pause will result when the number is dialed, as was described for Manual Dial.

The next prompt line will say:

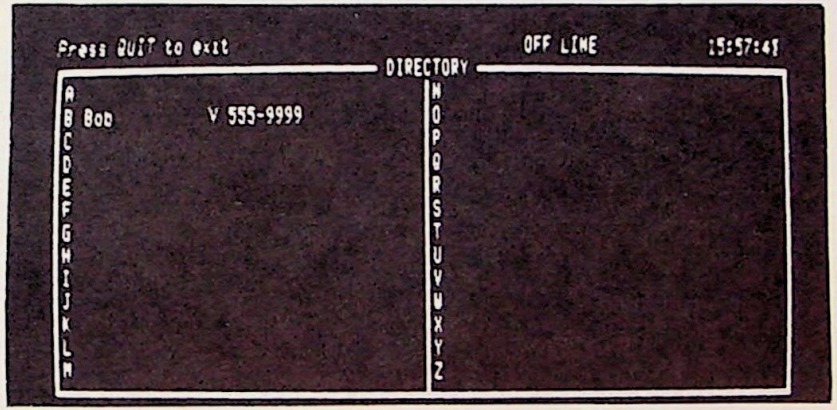
```
Call type (Telenet, tYmnet, Data, or Voice):
```

You can select the call type by typing either T, Y, D, or V. Since your first practice entry should be a Voice call, type V. Now the screen will say "OK? Y/N" and you should read what you have entered to be sure it is correct. Then type Y if it is OK, or N if you must do it over.

When your entry is OK and you press Y, the prompt will say:

```
Hold SAVE button, then hit RETURN
```

The SAVE button is located on the rear panel of the Keyboard module, between the Power and Printer connectors. Hold the button in and press RETURN. Do not release the SAVE button until you hear a "beep" and the Directory reappears with the number you entered.



Now try dialing the number that you entered in the Directory.

With the Main Menu on the screen, press the letter of the entry you made. You will see "DIALING" on the Monitor screen and hear clicking in the Keyboard. Pick up the telephone handset before the dialing is complete and wait for your party to answer. The cursor will indicate which number was selected.

You can repeat the above sequence for the storage and dialing of more phone numbers until "MEMORY FULL" appears on the screen. By changing long names to nicknames or initials, and eliminating unneeded hyphens or slashes in phone numbers, you may gain room for another entry or two.

NOTE: If you attempt to ADD an entry in a lettered area where there is already a listing, "In use, press RETURN" will appear on the screen.

You probably noticed how self-explanatory the prompts were as you entered names and numbers in the Directory. You will find it just as easy to ERASE, CHANGE, or ERASE ALL from the Actions menu. Perform the following steps to familiarize yourself with those Actions.

With the Main Menu on the screen, select F2 — CHANGE directory. Then select F2 (ERASE) — and follow the prompts that replace the Actions menu. Erase the entry that you made; then ADD it again for practice. If you try to erase a nonexistent Directory entry, the message "Not used, press RETURN" will appear.

Select F3 (CHANGE) — and follow the prompts. The procedure is identical to the ADD function, except that it allows you to replace a listing without first erasing the old one.

NOTE: Do not select F4 (ERASE ALL) unless you are prepared to reenter all of the numbers you want to save.

Entering Telenet, Tymnet, and Data numbers in the Directory is a bit more complex and will be described in detail later, in the "Data Communication" section of this Manual.

F3 — SETUP

```
ACTIONS
F1 - MANUAL dial          F3 - SETUP
F2 - CHANGE directory     F4 - ON LINE
```

From the Main Menu, Select F3 (SETUP). Note that the Directory changes to a list of Setup parameters, and the Actions menu tells you which Function key to press to INCREASE, DECREASE, or SAVE the changes, or SET time.

```
Press QUIT to exit                    OFF LINE          16:02:25
                              SETUP
A * Time set (00:00:00)          N   Auto repeat (on )
B   Clock display (on )          O   Key click (on )
C                                P
D * Auto answer after ( 0) rings  Q * Cursor (blink )
E   Wait ( 10) sec. for answer   R
F   / Pause (1.2) sec.           S
G                                T
H   (Full) duplex                U   Wrap at end of line (on )
I   Handshaking (XON/XOFF)       V   Auto LF on CR (off)
J                                W   Auto CR on LF (off)
K                                X
L                                Y
M                                Z
Select:                   * RESET restores default
                              ACTIONS
F1 - INCREASE             F3 - SET time
F2 - DECREASE             F4 - SAVE changes
```

Typical, commonly-used parameters and modes were preset in your Terminal when power was first applied. They are good starting points from which you can customize your Terminal for your own needs. As you read this section, you can change the parameters and experiment with their effect as much as you want. If you do not press F4 — and follow the SAVE changes prompt, the changes you make will be only temporary until you reset the Terminal, remove its power, or change them again.

Note the use of function keys F1 (up-arrow) to INCREASE and F2 (down-arrow) to DECREASE values as you set parameters. Where you need on/off switching, you can use either of these keys, as each press of either key changes the state.

After you have become familiar with their function and effect, you may want to permanently change some of the parameters. Just make the changes and press F4 to SAVE. A prompt will tell you to "Hold SAVE button, then hit RETURN". Be sure to hold the SAVE button in until after you have pressed RETURN and heard a "beep" from the Terminal. Time set, Auto answer, and Cursor (blink), shown with an asterisk, cannot be SAVEd; they will always return to the original status when the Terminal is reset or power is interrupted.

A * Time set (00:00:00). A 24-hour clock displays in the Status Line. That is, it registers the hours, minutes, and seconds up to 23:59:59 and starts over at 00:00:00. Two PM, for instance, is 14:00:00 and not 02:00:00. The clock can be used as an elapsed time indicator as well as to show the time of day. To set the time, select A and type in the time as six digits (two each for the hour, minute, and second). Nine thirty-three would be entered as 093300, etc. You need not type colons between the hour, minute, and second, but you must type a 0 (zero) before any single-digit hour, minute, or second. The clock will reset to the time you enter as soon as you type the last of six digits.

If you press F3 — SET time, the clock will reset to the time entered at A in the Setup menu.

B Clock display(on). If for any reason, you do not want the clock to display on the screen, you can turn it off (or on) by selecting B and then pressing either F1 or F2.

D * Auto answer after (0) rings. After selecting D, you can set the Terminal to answer incoming Data calls after up to 15 rings by successively pressing F1 or F2. If the number set is 0, Auto answer is turned off. If the Terminal answers a call which is not a Data call, the message "Answer Voice call, press RETURN" will be displayed. Pick up the handset; then press RETURN to answer the call. If the RETURN key is not pressed within 30 seconds, the Terminal will hang up.

E Wait (10) sec. for answer. When you are dialing a data communication number from the Directory, the Terminal will hang up the phone if it is not answered within the number of seconds entered. This value changes 5 seconds (maximum is 80 seconds) with each press of F1 or F2.

F / Pause (1.2) sec. Typing a / (slash) between digits of a telephone number, as you enter them by Manual Dial or in the Directory, will cause a pause when the number is dialed. You can change this value in .3-second increments from 1.2 to 5.7 seconds.

H (Full) duplex. Full duplex is typically used when you are on line with a host computer; half duplex is used when you are communicating with another Terminal. In Full duplex, your Monitor screen does not display as you type, but depends on the host computer to "echo" back each character, along with responses and information from the computer. Since terminals such as the ZT-1 do not "echo" received signals, they use half duplex when communicating with each other. Each Terminal's Monitor simultaneously displays what is sent and received.

I Handshaking (XON/XOFF). This is the ability of a terminal and computer to send "stop", "start". For example, if you were receiving (and printing) a document faster than your printer could print, a signal would be sent to stop the computer until the printer caught up. To manually stop (or interrupt) the computer, press and hold CTRL, then S. Then restart with CTRL Q.

N Auto repeat (on). This allows the keyboard characters to repeat if they are held down for more than 1/2 second.

O Key click (on). This is the key-click sound you hear as you press a key.

Q * Cursor (blink). The cursor can be either blinking or steady.

U Wrap at end of line (on). Causes the cursor to return to the left margin and begin a new line when it reaches the right margin.

V Auto LF on CR (on). Includes a LINE FEED when a RETURN is received from either the keyboard or the remote computer.

W Auto CR on LF (on). Includes a RETURN when a LINE FEED is received from either the keyboard or the remote computer.

If you have not SAVEd any of the parameters that you changed while experimenting, you can restore the original SETUP menu parameters (or any that you did SAVE) by resetting the Terminal. Simultaneously press the CTRL, SHIFT, and ESC keys. Then press HELP to restore the Main Menu to the screen.

F4 — ON LINE.

While you are communicating with a computer or another terminal, you may need to go OFF LINE to change a parameter, return to voice communication, or for some other reason. If you press and hold CTRL and a SHIFT key, and then press the SPACE bar, you will go OFF LINE without hanging up or terminating the call. You can then press HELP to call up the Main Manu, select the Action desired and make the changes, and then press F4 to go ON LINE again.

This completes the discussion of the Directory, Action Menus, and Setup of your Terminal. In the next section you will begin Communicating.

DATA COMMUNICATIONS

In the previous sections of this Manual, you tried the Manual Dial and Change Directory functions for making Voice calls. Now you will use the Terminal to communicate with your time-sharing service or with another ZT-1 Terminal. If you have subscribed to a time-sharing service, be sure to read their instructions for logging on, communicating, and logging off before you proceed.

Data calls are those made to another terminal or to a remote computer or time-sharing service. When you dial a Data call, the Terminal transmits a "data carrier" (high frequency tone) over the telephone line. The called terminal or computer detects the carrier and prepares to receive the data you send.

A Data call may be made by Manual Dial or from the Directory. The following procedures describe the Manual dialing of a Data call and entering a data phone number in the Directory.

NOTE: Before you place a Data call, check your SETUP Menu to be sure your Terminal is set for Full duplex to communicate with a time-sharing service. Also see that "Handshaking" is turned on, unless your time-sharing service does not recognize XON/XOFF handshaking. Refer to your time-sharing service instruction manual.

Time-Sharing Services

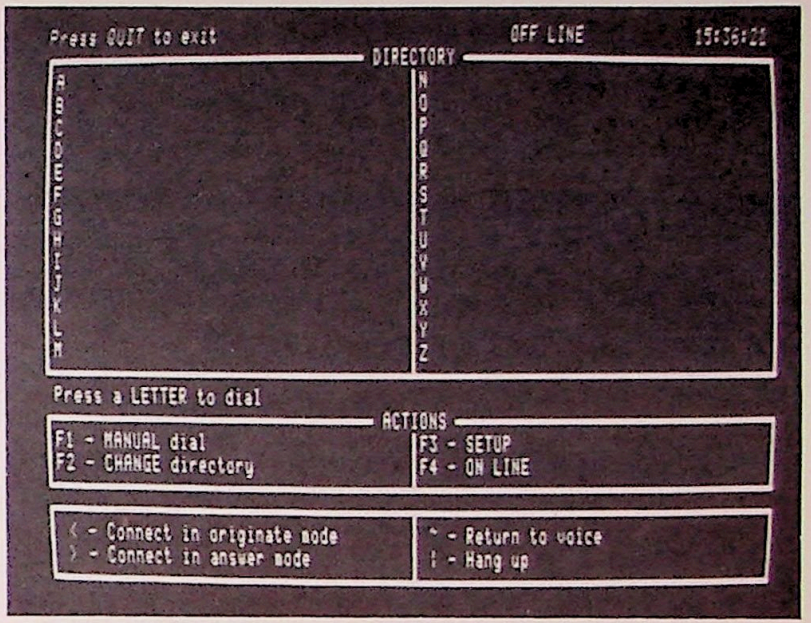
Some time-sharing computers are located in distant cities, which would mean a long distance call for you. However, most of the larger ones use one or more of the data networks such as Telenet or Tymnet, with "access numbers" in various areas of the United States and Canada. Access numbers for your area are supplied by the subscription service.

You cannot access (make contact with) time-sharing computers unless you have subscribed to their service. Your subscription not only entitles you to use their services, but will also provide you with identification and account numbers and perhaps a confidential "password", as well as instructions for using them.

MANUAL DIALING A DATA CALL

You can Manual Dial a Data call the same as a Voice call except that, after you enter the number and press RETURN, press F3 (Dial Data) to dial the number. When the host answers, you will be asked to "log on" with your terminal identification and possibly a "password". Use the following procedure to Manual Dial a Data call.

1. Display the Main Menu on the Monitor screen.



2. Press F1 — MANUAL dial. If no number appears after Dial # =, enter the phone number you wish to dial. Then press RETURN. Then press F3 — Dial Data

```
ACTIONS
F1 - Change dial #          F3 - Dial Data
     Dial # =               F4 - Dial Voice
```

3. If the number you want to dial appears after Dial # =, simply press F3 — Dial Data.

4. To call a new number, press F1 — Change dial # and enter the new number, followed by a RETURN. Then press F3 to dial the Data call.

Be patient after you have dialed. It may take several seconds for the host computer to answer. During this time the Status Line will indicate that the Terminal is WAITING for an answer to the Data call. When it does answer, your Monitor screen will change and the Status Line will show ON LINE. Your telephone handset can be left on its cradle throughout a Data call.

ENTERING A DATA CALL PHONE NUMBER IN THE DIRECTORY

After you have entered data or voice phone number(s) in the Directory, you can dial a number by simply pressing the letter corresponding to the desired number. When you dial other than a voice number from the Directory, the Terminal automatically transmits the data carrier to the host computer.

Use the following procedure to enter a data call phone number in the Directory.

1. Display the Main Menu on your screen. Then press F2 — CHANGE directory. The Monitor will display:

```
ACTIONS
F1 - ADD                    F3 - CHANGE
F2 - ERASE                  F4 - ERASE ALL
```

2. Press F1 — ADD. Then, after "Entry to ADD", press a letter (the initial of the person or computer whose number you will enter might be convenient).

3. Type the name and press RETURN.

4. Type the phone number and press RETURN. The screen now displays:

```
Call type (Telenet, tYmnet, Data, or Voice):
```

NOTE: If the phone number you entered is a Tymnet number, proceed to "Entering a Tymnet Number" on Page 32. If it is a Telenet number, proceed to "Entering a Telenet Number" on Page 32. For a data number (such as another ZT-1 Terminal) or a voice number, proceed with the following steps.

5. Press D for data or V for voice. The screen asks if it is OK? (Y/N).

6. Read over what you have typed and press Y for yes or N for no. If you type N, the CHANGE menu will return to the screen and you can reenter the letter, name, number, and call type.

7. When you have entered the correct information and pressed Y for yes, hold the SAVE button in while you hit RETURN. The Main Menu will then return to the screen.

You can now dial the number that you entered by merely pressing the letter corresponding to that number.

Entering a Tymnet Number

If you entered a Tymnet number in the first four steps (Page 30), proceed with the following steps.

```
Call type (Telenet, tYmnet, Data, or Voice):
```

5. Press Y for Tymnet. The screen now asks you for "Log on" information. Type both the system name and password on the line (as: Source10;prim; or Dow1;;). Then press RETURN.

6. When the screen asks "OK? (Y/N)", read over what you have typed and press Y for yes or N for no. If you press N, the CHANGE menu will return to the screen and you can redo your entry.

7. When you have entered the correct information and pressed Y for yes, press and hold the SAVE button while you press RETURN.

Entering a Telenet Number

If you entered a Telenet number in the first four steps (Page 30), proceed with the following steps.

```
Call type (Telenet, tYmnet, Data, or Voice):
```

5. Press T for Telenet. The screen now asks you for your Telenet Connect code. Enter the code, followed by a RETURN.

6. When the screen asks "OK? (Y/N)", read over what you have typed and press Y for yes or N for no. If you press N, the CHANGE menu will return to the screen and you can redo your entry.

7. When you have entered the correct information and pressed Y for yes, press and hold the SAVE button while you press RETURN.

When you enter a log-on sequence, pressing RETURN will cause the line to be terminated by a vertical bar. This bar identifies the end of the log-on sequence, which may contain trailing spaces. These trailing spaces **will** be transmitted as part of the log-on sequence.

A typical procedure for entering a data call phone number in the Directory is shown below. In this example, a fictitious name (Everybodys Data Base), phone number, and log on information is used. The responses that you type appear in boldface.

Entry to ADD: **E**
Name: **EDB (RETURN)**
Phone: **555-1234 (RETURN)**
Call type (Telenet, tYmnet, Data, or Voice) **Y**
Log on: **EDBSYS;EDBPASS; (RETURN)**

OK? (Y/N) **Y**
Hold SAVE button, then hit RETURN

Of course, you would enter the correct responses as supplied to you by your subscription time-sharing service.

If you wish to send only a partial log-on (for example, you may wish to transmit only a system but no password), terminate your log-on sequence with a period (“.”). The Terminal will transmit all characters up to but not including the period, and will not send a carriage return. At this time you may manually enter the remainder of the log-on sequence.

NOTE: If your Terminal is dialing or has not completed a log-on sequence, do **NOT** use the keyboard.

INTERRUPTING COMMUNICATION

If you must interrupt your communication (to change a parameter in the SETUP menu or for any other reason), press and hold the CTRL and SHIFT keys; then SPACE. This will take your Terminal OFF LINE without “hanging up” or disconnecting the call. Then you can resume by calling the Main Menu to your screen and pressing F4 — ON LINE.

When you are through communicating with the host, hang up by pressing CTRL ESC. Refer to the instructions supplied by your time-sharing service for the correct procedure to log off.

Remote Terminal

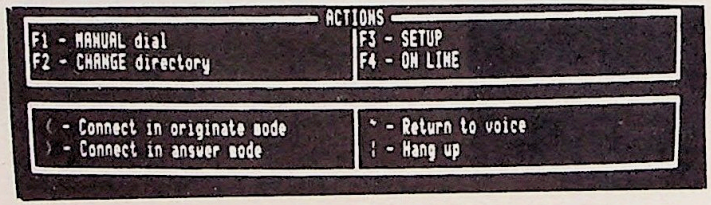
You can communicate with a remote terminal (such as another ZT-1) in the same manner as described for a time-sharing service, except that requests and responses for identification are not normally sent by a terminal.

Before you dial a remote terminal, check your SETUP Menu to be sure your Terminal is set for Half duplex, and the Auto LF on CR is on. After you dial the remote terminal, watch for the Menu to disappear and the Status Line to show ON LINE.

Type an appropriate greeting to the person using the remote terminal, such as:

```
This is George Smith calling 555-5555, Hi: RETURN / RETURN
```

Always end your message with a RETURN/RETURN to signal that you are waiting for a reply. The person at the other terminal should also type RETURN/RETURN when he is ready for your reply. Then you can continue your conversation with the remote terminal.



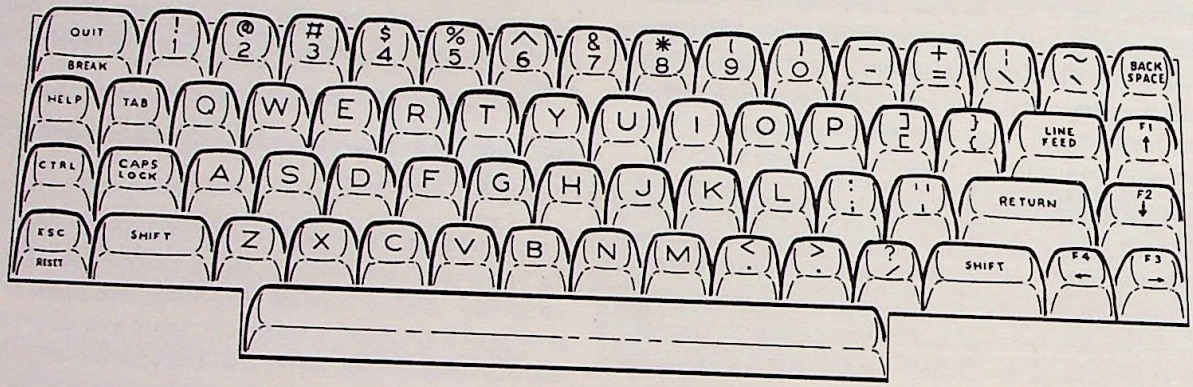
If you must interrupt your conversation (go OFF LINE) for any reason, press CTRL SHIFT SPACE as before. Then you can press HELP to bring up the Main Menu and perform whatever Actions you must. For example, you may want to talk on the phone with the party at the other end. In that case, pick up the telephone handset and press — (Return to Voice). You can then converse normally. To resume data communication, press F4 — ON LINE.

On the other hand, if you are in voice communication with someone who has a terminal connected to their phone line, you can easily change to data communication. Since one terminal must operate in "answer mode" and the other in "originate mode", first agree with the other party which of you will "connect in originate mode" and which in "answer mode". This determines the carrier frequencies used to send and receive data. Then, with the Main Menu displayed on your screen, press either the < key or the > key, depending on which mode you agreed upon. Your Menu will disappear and the Status Line will show ON LINE. You can place the telephone handset on its cradle and type your conversation on the Keyboard.

When you are through communicating with the remote, press CTRL ESC to hang up.

If you expect you might receive Data calls from another terminal, leave your Terminal in the Auto answer mode. To do this, select F3 — SETUP from the Main Menu, and press D "Auto answer after (0) rings". Change the zero to a number (1 to 15) and Auto answer is turned on. NOTE: If your unit is in the Auto answer mode, all out-going calls must be dialed by the Terminal.

THE KEYBOARD



With a Menu (Directory and/or Actions list) displayed on your Monitor, some keys on the Keyboard will respond differently than when you have data, text, or just a cursor displayed along with the Status Line. Also, the alphabet, numeral, and character keys function differently when unshifted, shifted, and with the CAPS LOCK key down. The function of the various keys will be described in this section of the Manual.

You will become more familiar with the Keyboard if you try the keys as they are described. Have your Keyboard and Monitor set up with only the Status Line (Press HELP, OFF LINE, Clock, and a cursor) showing as you read the following paragraphs. If you have a printer, connect it as described on Page 36, turn it on and make sure it is ready to print.

Check your SETUP parameters (Page 23) and be sure the following are set as indicated.

D	Auto answer after (0) rings
N	Auto repeat (on)
O	Key click (on)
Q	Cursor (blink)
U	Wrap at end of line (on)
V	Auto LF on CR (off)
W	Auto CR on LF (off)

The following description of the Keyboard will assume that the above parameters are set.

NOTES:

1. As you become familiar with the Keyboard, you will notice that when typing fills a line on the screen, the cursor will automatically move to the beginning of the next line. This is the "Wrap at end of line" feature that was set to "on" in the SETUP menu.

2. All alphabet, numeral, and character keys will repeat if held down for more than a half second. This is the "Auto-repeat" feature that was set to "on" in the SETUP menu.

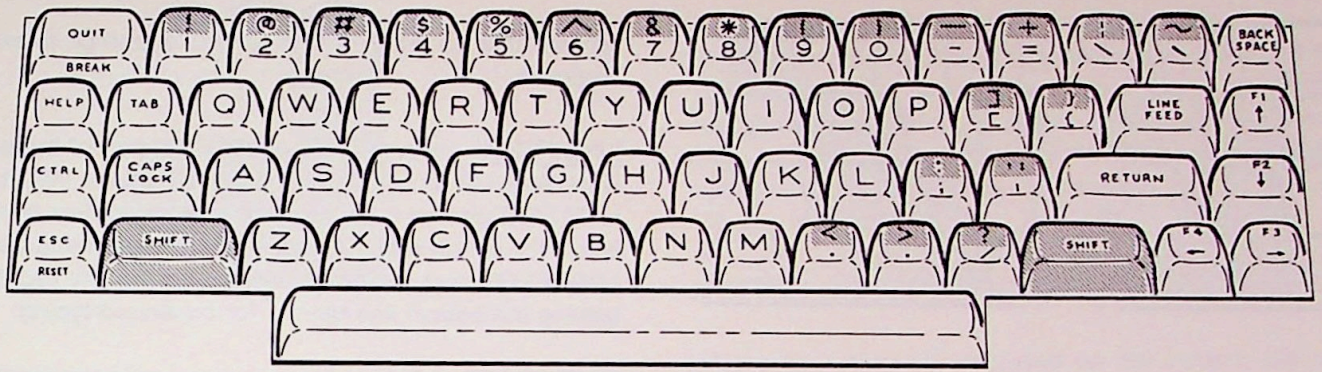
3. If you fill the screen with typing, the first line will move upward (scroll), off the top of the screen, and the new line will show at the bottom. NOTE: The first line of text is lost when it scrolls upward. In actual use, you would probably have read the first line, or output it to a printer or host computer before it scrolled upward.

4. While you are practicing on the Keyboard, use ESC E to clear the screen, ESC H to home the cursor (to the upper left corner of the screen), and the cursor control (arrows) and tab keys to position the cursor. You may wish to also practice using other ESCape sequences that are listed in the Appendix.

5. If you have a printer connected to your Terminal, be sure its power switch is in the ON position, and it is ready to print, if you intend to print out your text.

ALPHABET KEYS

Normally, you should have the CAPS LOCK key up, so lower-case letters will be produced by the 26 alphabet keys. If you press an alphabet key while you hold down either of the SHIFT keys, or with the CAPS LOCK key down, upper-case or capital letters are produced.

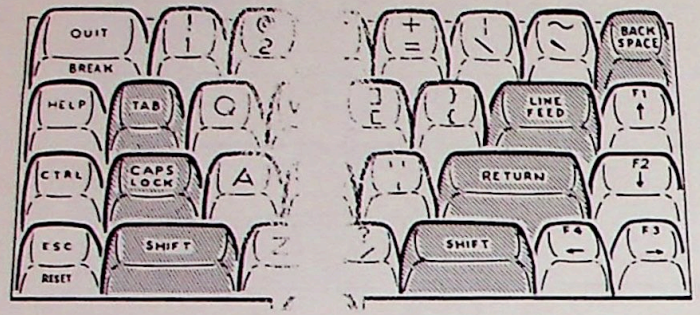


NUMERALS AND OTHER CHARACTERS

Numbers 1 through 9 and 0, and characters that are printed on the lower half of the key tops will be produced when you are typing unshifted or with the CAPS LOCK key either up or down. The CAPS LOCK key has no effect on the characters printed on the upper half of the key tops. They are produced ONLY if you hold down either SHIFT key while you press the character key. These characters are shown shaded in the illustration above.

CAPS LOCK

With the CAPS LOCK key down, all letters are produced in capitals or upper-case. However, as noted above, CAPS LOCK does not effect the numerals or characters printed on the lower half of the key tops. To produce the characters that are printed on the upper half of the key tops, you must hold down either SHIFT key while you strike the character.



OTHER TYPING KEYS

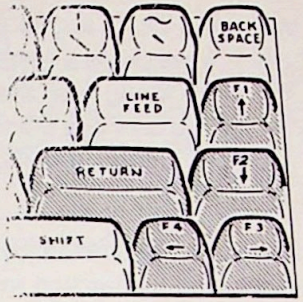
RETURN — When the Terminal is OFF LINE and only the Status Line is displayed, the RETURN key moves the cursor to the left edge of the next line on the Monitor screen. If the Auto LF on CR is turned off (SETUP menu), then the RETURN key will move the cursor to the beginning of the same line.

NOTE: The RETURN key is also normally used when the Terminal is ON LINE to a computer, or with a Menu on the screen, after you enter data in reply to a prompt, to execute a response.

LINE FEED — Moves the cursor to the start of the next line when Auto CR on LF is on in the SETUP menu. When it is off, LINE FEED moves the cursor to the same position on the next line. If the cursor is at the bottom of the screen and you press LINE FEED, text will scroll upward, losing the top line and leaving the bottom line blank - for continued typing.

BACKSPACE — Moves the cursor one space to the left each time you press the key until it reaches the left margin.

TAB — Each time you press the TAB key, the cursor moves to the first space in the next tab column. There are eight spaces in a tab column in this Terminal. If the cursor is within eight columns of the right margin of the screen, the TAB key will still transmit the TAB code, but the cursor will only move one column at a time until it reaches the right margin. NOTE: When you are ON LINE with a host computer, the code transmitted by the TAB key may be echoed as spaces to adjust the tab column to other than eight spaces wide.



CURSOR CONTROL KEYS

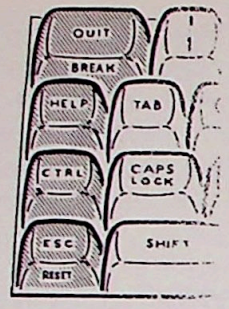
The cursor control keys move the cursor up, down, left, or right, as indicated by the arrows printed on them. Each press of the key moves the cursor one character or one line in the direction of the arrow. If you hold the key down, the cursor will move rapidly in the direction of the arrow. When the cursor reaches any edge of the screen, further attempts to move it in that direction will be ignored.

You can also control the cursor by using ESCape sequences. While some basic ESCape sequences are described under "Special Function Keys", a complete list of ESCape sequences is presented in the Appendix section of this Manual. Detailed technical descriptions of the ESCape sequences are contained in the ZT-1 Technical Manual.

ACTION SELECT (FUNCTION) KEYS

Whenever a Menu is displayed on the screen, the cursor control keys operate as Function keys (F1, F2, F3, and F4), and are used to select Actions from the Menu, as described in the "Operation" section of this Manual.

NOTE: Up to this point, the Keyboard has been described in the OFF LINE mode, without a menu displayed. The keys produced letters and characters, and the cursor control keys positioned the cursor on the screen. The following description of Special Function Keys will repeat some of the information that was presented in the "Operation" section of this Manual.



SPECIAL FUNCTION KEYS

You will use most of the following function keys while you are ON LINE with a host computer or terminal, which will be at the other end of the telephone line. These keys do not print on the Monitor screen, but send commands to the host.

NOTE: As with characters printed on the upper half of key tops, you must press and hold either SHIFT key while you strike a function key that calls for a SHIFT.

QUIT/BREAK — When the QUIT key is pressed while you hold down either SHIFT, it becomes a BREAK key. When the Terminal is OFF LINE and a Menu is on the screen, the QUIT key (no SHIFT) will return the previous Menu to the screen, or, if the Main Menu is on the screen, it will remove all display except the Status Line.

While ON LINE the code transmitted by the QUIT key is interpreted by the host, and its function may vary.

When you hold down either SHIFT key and press the QUIT/BREAK, a BREAK or interrupt signal is transmitted to the host computer. The host interprets the BREAK signal and its meaning may vary from one time-sharing system to another.

HELP — If you press the HELP key while OFF LINE and without a Menu on the screen, the Main Menu (Directory and Actions list) will appear. If you press HELP while you are ON LINE with a host, the screen may display a list of available functions and menus from the host, but only if the host computer recognizes the code that HELP key transmits as a request for such menus.

CTRL (Control) — The CTRL key is used with other keys for control functions, and must be held down while you press the other key. For example, If you press and hold CTRL while you press ESC, you will quickly terminate a Data call ("hang up") and the Main Menu will return to the screen. Other uses of the CTRL key will be described later.

ESC/RESET — The ESCape key is followed by various other keys to generate commands called ESCape sequences. You should not hold down the ESC key while you press the accompanying letter or character. However, if the sequence requires a capital letter or a character that is printed on the upper half of the key tops, be sure to hold down the SHIFT key as you press the character.

A complete list of the ESCape sequences appears in the Appendix section of this Manual, while their technical definitions appear in the ZT-1 Technical Manual. The following are examples of some basic ESCape sequences.

Basic ESCape Sequences

FUNCTION	ESC
Clear screen display	ESC E
Cursor to home position	ESC H
Save cursor position	ESC j
Set cursor to saved position	ESC k
Insert line in text	ESC L
Delete line in text	ESC I
Printer ON (when OFF LINE)	ESC x:
Printer OFF (when OFF LINE)	ESC y:
Output page to printer	ESC ` (ESC, grave accent)
* Printer ON/OFF (when ON LINE)	CTRL SHIFT P (CAPS LOCK will not do.)

NOTE: If you simultaneously press the SHIFT, ESC, and CTRL keys, you will reset the Terminal. The clock will reset to 00:00:00, and any parameters that you might have set and not saved in the SETUP menu will be returned to default or previously saved values.

* While this is not an ESCape sequence, it is a useful command to control a printer while you are ON LINE with a host computer or another terminal.

USING A PRINTER

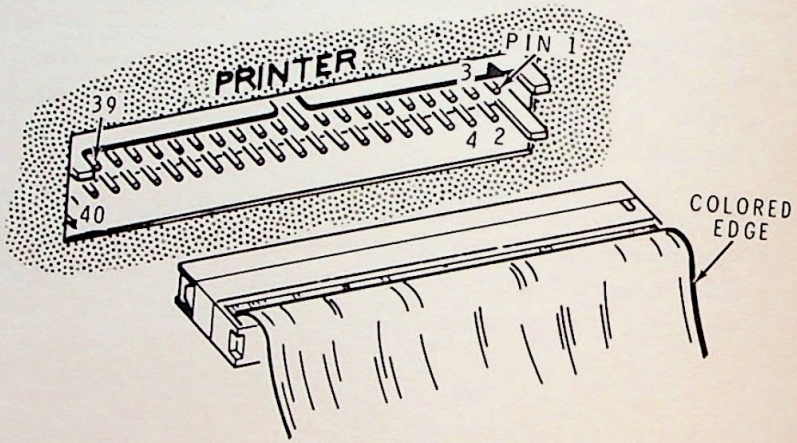
ZT-1 PRINTER PORT

3M #3417 series (or equivalent)

		PIN		
$\overline{\text{DATA STROBE}}$		1.	2.	GROUND
LEAST SIGNIFICANT DATA BIT	D0	3.	4.	
	D1	5.	6.	
	D2	7.	8.	
	D3	9.	10.	
	D4	11.	12.	
	D5	13.	14.	
	D6	15.	16.	
MOST SIGNIFICANT DATA BIT	D7	17.	18.	
$\overline{\text{ACKNOWLEDGE}}$		19.	20.	NO CONNECTION
NO CONNECTION		21.	22.	
		23.	24.	
		25.	26.	
		27.	28.	
		29.	30.	
		31.	32.	
		33.	34.	
		35.	36.	
		37.	38.	GROUND
		39.	40.	NO CONNECTION

If you have a line printer with a Centronics compatable parallel interface, you can use it to provide a printout of your data communications, or to make your Terminal function as an electronic typewriter.

The Printer port on the rear panel of your Terminal requires a 3M #3417 series (or equivalent) connector. Check your printer specifications for the correct pin connections of the connector as shown at the left.



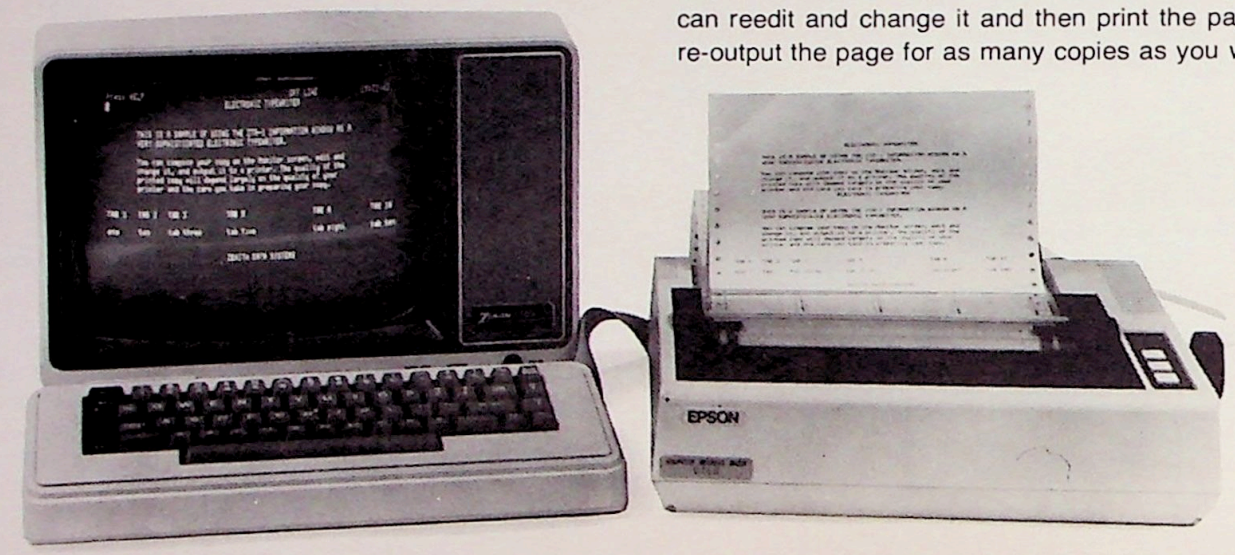
With your printer connected to a power receptacle and to the Printer port on the rear of the Keyboard, be sure its Power switch is on and that it is "on line" and ready to print.

If you turn on the printer from your Keyboard (ESC x: or toggle with CTRL SHIFT P), text will output a line at a time. Or, you can output a page of text by pressing ESC ` (escape, grave accent), even if you had output a line at a time or if you had not turned on the printer from the Keyboard.

USE AS AN ELECTRONIC TYPEWRITER

This section will discuss the use of your Terminal with a printer as an electronic typewriter. If you do not have a printer, you may ignore this section of the Manual.

With a parallel interface printer connected, you can use your Information Terminal as an electronic typewriter. You can type a full screen (page) of text, edit and correct it, and then output the screen to the printer. Or, you can output dynamically, a line at a time, as you compose on the screen. Even after you have output a line at a time, and composed a full page of text, you can reedit and change it and then print the page. You can re-output the page for as many copies as you want.



NOTE: While you are using your Terminal as a typewriter, your telephone can be used independently to place or receive Voice calls. However, if you are likely to receive calls while using the Terminal as a typewriter, use the SETUP menu to set the Auto-answer to 0 (off). This is because any incoming Data call (with Auto-answer ON) would trigger the Terminal to ON LINE and clear the screen of all text.

To use the "typewriter" feature:

1. Press QUIT to remove the menus and clear all display except the Status Line from the screen.

2. Be sure the Status Line shows "OFF LINE". (Press the CTRL SHIFT and SPACE keys if necessary.)

3. Press ESC x: to turn on the printer if you want each line to print as it is completed. The word PRINTER should display on the Status Line. If you do not want to print until you have composed and edited the page, press ESC y: to turn off the printer.

4. Proceed to compose your text on the screen. Use the letter, number, character, and cursor control keys as they were described in the "Keyboard" section of this Manual. You may also use the TAB key to indent text or to center headings, and the RETURN key to end a line and start a new one.

5. When you have finished your page of text, or when you near the bottom of the screen, output the page to the printer by pressing ESC ` .

6. If you have more text to compose, clear the screen by typing ESC E and proceed to compose and output your text as before.

7. When you have finished using your Terminal as a typewriter, be sure the printer is turned off (ESC y:).

NOTE: If you are printing a line at a time, it will be necessary to press RETURN and LINE FEED at the end of each line, or configure your printer to send an automatic line feed upon receiving a carriage return.

APPENDIX

This Appendix will identify the ESCape sequences and the ASCII character codes that are used with your ZT-1 Terminal. A more detailed description of the ESCape sequences, as well as the characters generated in the Graphics mode, is presented in the ZT-1 Technical Manual.

ESCape Sequences

There are several commands in the form of ESCape sequences that permit you to position the cursor, edit and erase text, control the Keyboard, output to a printer, and perform other functions. The most basic ESCape sequences were defined in the "Operation" section of this Manual. This expanded list is presented as reference for advanced computer terminal users.

Some of these functions have been programmed into you. Terminal as single keystrokes, such as the cursor control arrows, or those in the SETUP menu.

To use the ESCape sequences, press the ESC key before you type the given letter or character. Because some of the letters and characters in the ESCape sequences are lower-case and some are upper-case, release the CAPS LOCK key to the up position. Then you will know that you must also press and hold either SHIFT key for upper-case letters or for any characters that are printed on the upper half of the key tops.

NOTE: An asterisk (*) in the following lists indicates that the function is also available in the SETUP menu.

VT52 code?

Cursor Control Functions

Cursor up one line (Up Arrow)	ESC A
Cursor down one line (Down Arrow)	ESC B
Cursor to right (Right Arrow)	ESC C
Cursor to left (Left Arrow)	ESC D
Cursor to home	ESC H
Save cursor position	ESC j
Cursor to saved position	ESC k
Steady cursor *	ESC x;
Blinking cursor *	ESC y;
Disable cursor	ESC x 5
Enable cursor	ESC y 5

Edit and Erase Functions

Clear screen display	ESC E
Erase to beginning of display	ESC b
Erase to end of page	ESC J
Erase to beginning of line	ESC o
Erase to end of line	ESC K
Erase entire line	ESC l
Insert line	ESC L
Delete line	ESC M

Keyboard Control

Disable key click *	ESC x 2
Enable key click *	ESC y 2
Disable auto-repeat keyboard*	ESC x <
Enable auto-repeat keyboard *	ESC y <
Auto line feed on return *	ESC x 8
Cancel auto line feed *	ESC y 8
Auto return on line feed *	ESC x 9
Cancel return on line feed *	ESC y 9
Enter reverse video mode	ESC p or ESC s 1
Exit reverse video mode	ESC q or ESC s 0
Wrap around at end of line *	ESC v
Discard at end of line *	ESC w
Reset to power-up states	ESC z

no ESC x 1 - enable 25th line
3 - hold screen mode
4 - block cursor
6 - keypad - shifted
7 - keypad alternate

Display Control

Normal display	ESC s 0 or ESC q
Reverse video display	ESC s 1 or ESC p
Blinking display	ESC s 2
Reverse video plus blinking	ESC s 3
Half intensity display	ESC s 4
Reverse video + half intensity	ESC s 5
Blinking + half intensity	ESC s 6
Reverse + blinking + half	ESC s 7
Enable status line	ESC y =
Disable status line	ESC x =

vidio
4 2 1
1 1 1
half blink Rev

Clock Functions

Enable clock display *	ESC c
Disable clock display *	ESC d
Send time to host	ESC e
Set the time * (HHMMSS)	ESC X

ON LINE Control Functions

(Depend on host system)

Stop the display	CTRL S
Restart the display	CTRL Q

Other Functions

Transmit status line	ESC]
Transmit page	ESC #
Transmit this line	ESC ^
Transmit character at cursor	ESC _
Transmit page to printer	ESC ` (ESC, grave accent)
Printer ON	ESC x:
Printer OFF	ESC y:
Reset Terminal	CTRL SHIFT ESC
Hang up phone, Display Menu	CTRL ESC
Printer ON/OFF	CTRL SHIFT P
OFF line/ON line	CTRL SHIFT SPACE
QUIT	ESC ¦
HELP	ESC ~

ASCII Characters and Codes

The American Standard Codes for Information Interchange (ASCII) were developed as a common language for operating a computer and communicating between computer terminals.

In the following list, the characters in the shaded areas are not processed by the ZT-1 Terminal.

7-BIT OCTAL CODE	DECIMAL CODE	HEX CODE	CONTROL KEYS	DESCRIPTION
000	0	0	@	Null, tape feed.
001	1	1	A	Start of heading.
002	2	2	B	Start of text.
003	3	3	C	End of text.
004	4	4	D	End of transmission.
005	5	5	E	Enquiry.
006	6	6	F	Acknowledge.
007	7	7	G	Rings the bell.

7-BIT OCTAL CODE	DECIMAL CODE	HEX CODE	CONTROL KEYS	DESCRIPTION
010	8	8	H	Backspace; also FEB, format effector backspace.
011	9	9	I	Horizontal tab.
012	10	A	J	Line feed: advances cursor to next line.
013	11	B	K	Vertical tab (VTAB).
014	12	C	L	Form feed to top of next page.
015	13	D	M	Carriage return to beginning of line.
016	14	E	N	Shift out.
017	15	F	O	Shift in.
020	16	10	P	Data line escape.
021	17	11	Q	Device control 1: turns transmitter on (XON).
022	18	12	R	Device control 2.
023	19	13	S	Device control 3: turns transmitter off (XOFF).
024	20	14	T	Device control 4.
025	21	15	U	Negative acknowledge: also ERR (error).
026	22	16	V	Synchronous idle (SYNC).
027	23	17	W	End of transmission block.
030	24	18	X	Cancel (CANCL). Cancels current escape sequence.
031	25	19	Y	End of medium.
032	26	1A	Z	Substitute.
033	27	1B	[	Escape.
034	28	1C	\	File separator.
035	29	1D	]	Group separator.
036	30	1E	^	Record separator.
037	31	1F	-	Unit separator.

7-BIT OCTAL CODE	DECIMAL CODE	HEX CODE	CHARACTERS	DESCRIPTION
040	32	20	SP	Space.
041	33	21	!	Explanation point.
042	34	22	"	Quotation mark.
043	35	23	#	Number sign.
044	36	24	$	Dollar sign.
045	37	25	%	Percent sign.
046	38	26	&	Ampersand.
047	39	27	'	Acute accent or apostrophe.
050	40	28	(	Open parenthesis.
051	41	29	)	Close parenthesis.
052	42	2A	*	Asterisk.
053	43	2B	+	Plus sign.
054	44	2C	,	Comma.
055	45	2D	–	Hyphen or minus sign.
056	46	2E	.	Period.
057	47	2F	/	Slash.
060	48	30	0	Number 0.
061	49	31	1	Number 1.
062	50	32	2	Number 2.
063	51	33	3	Number 3.
064	52	34	4	Number 4.
065	53	35	5	Number 5.
066	54	36	6	Number 6.
067	55	37	7	Number 7.

7-BIT OCTAL CODE	DECIMAL CODE	HEX CODE	CHARACTERS	DESCRIPTION
070	56	38	8	Number 8.
071	57	39	9	Number 9.
072	58	3A	:	Colon.
073	59	3B	;	Semicolon.
074	60	3C	<	Less than.
075	61	3D	=	Equal sign.
076	62	3E	>	Greater than.
077	63	3F	?	Question mark.
100	64	40	@	At sign.
101	65	41	A	Letter A.
102	66	42	B	Letter B.
103	67	43	C	Letter C.
104	68	44	D	Letter D.
105	69	45	E	Letter E.
106	70	46	F	Letter F.
107	71	47	G	Letter G.
110	72	48	H	Letter H.
111	73	49	I	Letter I.
112	74	4A	J	Letter J.
113	75	4B	K	Letter K.
114	76	4C	L	Letter L.
115	77	4D	M	Letter M.
116	78	4E	N	Letter N.
117	79	4F	O	Letter O.

7-BIT OCTAL CODE	DECIMAL CODE	HEX CODE	CHARACTERS	DESCRIPTION
120	80	50	P	Letter P.
121	81	51	Q	Letter Q.
122	82	52	R	Letter R.
123	83	53	S	Letter S.
124	84	54	T	Letter T.
125	85	55	U	Letter U.
126	86	56	V	Letter V.
127	87	57	W	Letter W.
130	88	58	X	Letter X.
131	89	59	Y	Letter Y.
132	90	5A	Z	Letter Z.
133	91	5B	[	Open brackets.
134	92	5C	\	Reverse slash.
135	93	5D	]	Close brackets.
136	94	5E	↑	Up arrow/caret.
137	95	5F	_	Underscore.
140	96	60	`	Grave accent.
141	97	61	a	Letter a.
142	98	62	b	Letter b.
143	99	63	c	Letter c.
144	100	64	d	Letter d.
145	101	65	e	Letter e.
146	102	66	f	Letter f.
147	103	67	g	Letter g.

7-BIT OCTAL CODE	DECIMAL CODE	HEX CODE	CHARACTERS	DESCRIPTION
150	104	68	h	Letter h.
151	105	69	i	Letter i.
152	106	6A	j	Letter j.
153	107	6B	k	Letter k.
154	108	6C	l	Letter l.
155	109	6D	m	Letter m.
156	110	6E	n	Letter n.
157	111	6F	0	Letter o.
160	112	70	p	Letter p.
161	113	71	q	Letter q.
162	114	72	r	Letter r.
163	115	73	s	Letter s.
164	116	74	t	Letter t.
165	117	75	u	Letter u.
166	118	76	v	Letter v.
167	119	77	w	Letter w.
170	120	78	x	Letter x.
171	121	79	y	Letter y.
172	122	7A	z	Letter z.
173	123	7B	{	Left brace.
174	124	7C	¦	Vertical bar (broken).
175	125	7D	}	Right brace.
176	126	7E	~	Tilde.
177	127	7F	DEL	Delete (rubout).

Transmitted Codes

The following tables list the codes transmitted by the Terminal when the indicated keyboard keys are pressed.

KEY	LOWER CASE		UPPER CASE	
	OCTAL	HEX	OCTAL	HEX
A	141	61	101	41
B	142	62	102	42
C	143	63	103	43
D	144	64	104	44
E	145	65	105	45
F	146	66	106	46
G	147	67	107	47
H	150	68	110	48
I	151	69	111	49
J	152	6A	112	4A
K	153	6B	113	4B
L	154	6C	114	4C
M	155	6D	115	4D

KEY	LOWER CASE		UPPER CASE	
	OCTAL	HEX	OCTAL	HEX
N	156	6E	116	4E
O	157	6F	117	4F
P	160	70	120	50
Q	161	71	121	51
R	162	72	122	52
S	163	73	123	53
T	164	74	124	54
U	165	75	125	55
V	166	76	126	56
W	167	77	127	57
X	170	78	130	58
Y	171	79	131	59
Z	172	7A	132	5A

ALPHABETIC KEYS

KEY	UNSHIFTED OCTAL	UNSHIFTED HEX	SHIFTED OCTAL		HEX
0	060	30	050	)	29
1	061	31	041	!	21
2	062	32	100	@	40
3	063	33	043	#	23
4	064	34	044	$	24
5	065	35	045	%	25
6	066	36	136	↑	5E
7	067	37	046	&	26
8	070	38	052	*	2A
9	071	39	050	(	28
-	055	2D	137	–	5F
=	075	3D	053	+	2B
[	133	5B	135	]	5D
;	073	3B	072	:	3A
'	047	27	042	"	22
,	054	2C	074	<	3C
.	056	2E	076	>	3E
/	057	2F	077	?	3F
`	140	60	176	~	7E
\	134	5C	174	¦	7C
{	173	7B	175	}	7D

NON-ALPHABETIC KEYS

KEY	OCTAL CODE	HEX CODE
RETURN	015	0D
LINE FEED	012	0A
BACKSPACE	010	08
SPACE BAR	040	20
TAB	011	09
DELETE	177	7F
ESC	033	1B

CONTROL KEYS

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